

## **EXECUTIVE SUMMARY**

In October 2000, President Clinton initiated an interagency process to consider the feasibility of accommodating International Mobile Telecommunications for the Year 2000 (IMT-2000) within the 1755-1850 and 2500-2690 MHz radio frequency bands. The following report documents the Defense Department's regulatory, technical, operational, and cost assessment with respect to the feasibility of accommodating IMT-2000 systems in the 1755-1850 MHz band.

The conclusions of this report are based on the fundamental principle that the Department of Defense (DoD) cannot accept any degradation to mission capability resulting from a spectrum reallocation action. Loss of access to spectrum, above and beyond that already relinquished as a result of the Omnibus Budget Reconciliation Act of 1993 and the Balanced Budget Act of 1997, would jeopardize the DoD's ability to execute its mission. Congress, recognizing this principle in the National Defense Authorization Act (NDAA) for Fiscal Year 2000, has directed that the Defense Department shall not surrender use of a band of frequencies in which it is a primary user, as is the case with regard to the 1755-1850 band, unless an alternative band or bands are provided of comparable technical characteristics that will ensure no loss of mission capability (as certified by the Secretary of Defense, Chairman of the Joint Chiefs of Staff, and the Secretary of Commerce). Hence, any reallocation action would have to meet the following specific conditions:

1. If a decision is made to vacate all or a part of the 1755-1850 MHz band, the DoD must retain protected access until the last DoD system has migrated. Current regulatory provisions that protect existing DoD operations in the band must continue throughout any migration or transition period.
2. DoD must be provided regulatory protection in any new band associated with a reallocation action equivalent to the protection currently provided in the 1755-1850 MHz band.
3. DoD systems moving to a new band must receive timely domestic spectrum certification and have reasonable prospect of achieving international coordination consistent with mission requirements.
4. During any transition period in which DoD is moving out of the band or a portion thereof, new users would be allowed to operate in the band only to the extent that their operations do not interfere with DoD operations.
5. Timely cost reimbursement must be provided to the DoD per NDAA 1999.

The wide variety of systems the DoD operates in the 1755-1850 MHz band are unique to this band and crucial to the defense of the United States (US) and its allies. The 1755-1850 MHz band is used for critical national defense systems such as telemetry, tracking, and commanding of satellite systems (i.e., Global Positioning System (GPS), Milstar, and Defense Support Program (DSP), among others); precision guided munitions; tactical radio relay communication systems; air combat training systems; targeting; intelligence; and the real-time delivery of voice, video, and data information to warfighters and their commanders. The US and its national defense forces would be at a substantial strategic and tactical disadvantage in combat and the outcome of battles and peacekeeping operations could be jeopardized if the DoD were to lose its use of the band without provision of comparable spectrum and satisfaction of other conditions as presented in Section 2, *Essential Conditions*.

This report examines the feasibility of accommodating IMT-2000 systems by sharing the 1755-1850 MHz band with the DoD. Full band sharing was examined. Predicted interference to both IMT-2000 and DoD systems would preclude compatible operation at a large number of metropolitan areas and over large geographic areas of the country. Unacceptable operational restrictions would be required to mitigate the interference with IMT-2000 systems. *Therefore, full band sharing is not possible.*

This report also examines whether the DoD can fully vacate the 1755-1850 MHz band to accommodate IMT-2000. The most optimistic estimates, based on funding being available in Fiscal Year 2002 (FY02) to accomplish programmatic actions, indicate the *DoD is unable to totally vacate this band until well beyond the timelines established for this study (i.e., by 2003, 2006, or 2010). Estimates indicate that, regardless of financial investment, vacating the band could not be accomplished for most non-space systems until 2010 and beyond; and legacy space systems would require continued protected access to this spectrum until 2017 and beyond.* The preliminary estimated cost to transition DoD systems out of the band in accordance with these acceptable DoD timelines, is in excess of \$4.3B in Then Year dollars (TY\$). Migration prior to these dates would require premature system termination, which would have extremely serious implications to the DoD's ability to effectively execute its mission. Total relocation from the band is impossible unless comparable spectrum that is operationally suitable with equivalent regulatory protection is made available and the costs of relocation are fully reimbursed. This report, however, indicates operationally suitable comparable spectrum may not be readily available.

Band segmentation options consistent with the options presented in the US Study Plan are also assessed. The segmentation options are:

- Band segmentation/Partial Band Sharing
  - 1755-1805 MHz retained for operation of government systems and 1805-1850 MHz potentially reallocated to non-government use
  - 1790-1850 MHz retained for operation of government systems, and 1755-1790 MHz potentially reallocated to non-government use as part of a phased sharing approach (1710-1755 MHz available immediately, 1755-1780 MHz available at some mid-term future date, and 1780-1790 MHz would be made available in the long term ).
- Band segmentation/Partial Band sharing (as above) with the addition of access to Alternate (comparable) Bands

*Due to the potential for degradation to operational capability, losing access to any portion of the 1755-1850 MHz band without access to additional comparable spectrum and adequate time to withdraw from the specified band is unacceptable to the DoD.* If the conditions of provision of comparable spectrum, full cost reimbursement, on time program execution, and operationally protected use of the spectrum through the course of any necessary transition are met, some band segmentation may be feasible. The feasibility of any segmentation requires the full cooperation of, among other things, the Federal Communications Commission, the National Telecommunications and Information Administration, the IMT-2000 Industry, and other users of the radio spectrum. This cooperation entails acceptance of DoD transition timelines and DoD's continued unrestricted operation in the existing band during the course of any transition. *The timelines for accommodation of IMT-2000 in any segment of the 1755-1850 MHz band by the DoD are comparable to those of full band sharing.* Even if the above conditions are met, transition by the DoD for this option could not be completed until 2010 and beyond for most non-space systems and until 2017 and beyond for the space systems. The preliminary estimated cost to relocate DoD systems in accordance with these acceptable DoD timelines, for the band segmentation options range from at least \$2.8B (TY\$) to in excess of \$4.3B (TY\$). As in the case of vacating the total band, migration prior to these dates would require premature system termination, which would have extremely serious implications to the DoD's ability to effectively execute its mission. These dates are also predicated on funding availability in FY02.

The following bands were assessed for their ability to accommodate additional DoD systems migrated from the 1755-1850 band due to IMT-2000 accommodation: 2025-2110 MHz; 2200-2290 MHz; 4.4-5.0 GHz; and 7-8 GHz. Preliminary review indicates these bands could not accommodate the introduction of the additional non-space systems without operational degradation to and from critical systems such as the Cooperative Engagement Capability, the Defense Satellite Communication System,

DoD satellite downlinks, and numerous fixed and mobile operations. The 2025-2110 MHz band may be feasible for the introduction of the DoD satellite operations functions but there are specific regulatory issues that must be addressed. Although other bands were not evaluated in this report, the availability of sufficient comparable spectrum is suspect in light of the ever-growing demand and competition for spectrum access.

In assessing the feasibility of sharing or segmentation of the designated band, or migration out of the band, this report addressed only existing and planned DoD systems. Given the growing demand for spectrum to support information-intensive operations, it is highly likely that new DoD requirements for this band and other DoD bands will arise. Thus the full impact to DoD of surrendering all or a portion of the band is likely to be greater than the assessment provided in this report.

The findings in this report are the result of a very compressed schedule, initiated by the 13 October 2000 Presidential Memorandum (PM) and the related 20 October Commerce Department Plan to Select Spectrum for third-generation (3G) Wireless Systems in the United States, that did not provide time for thorough analysis and review of the complex subject. Additional analysis may be required in some areas. The results of this expedited study are especially sensitive to the assumptions used in the assessment. Some of the more critical assumptions include: the relocation band selected for systems that must move; no satellites will require replacement prior to programmed replenishment; and IMT-2000 parameters. If these, or any other of the assumptions used in this assessment are altered, the results presented will significantly differ and require reassessment. Furthermore, the timelines assumed programming, budgeting, and contracting processes are successfully executed without schedule perturbations. Finally, the costs estimated herein do not take into consideration the potential secondary and tertiary costs of moving incumbent DoD users out of the band, with attendant operational changes in tactics, training, doctrine, personnel, and long-lead procurement.